

## Lesson 4.8, continued

5. Because the discriminant is under the radical sign, you must take the square root of its value. The square root of a positive number is a real number, so the function has a positive and a negative root. The square root of zero is zero, so the function has one root. You can not take the square root of a negative number, so the function has no real roots. Therefore, a discriminant with a positive value means there are two solutions, a discriminant with a value of zero means there is one solution, and a discriminant with a negative value means there are no real solutions.

### Practice Level A

1.  $2x^2 + x + 4$ ;  $a = 2$ ,  $b = 1$ ,  $c = 4$
2.  $x^2 - 2x - 3$ ;  $a = 1$ ,  $b = -2$ ,  $c = -3$
3.  $-4x^2 - 3x - 2$ ;  $a = -4$ ,  $b = -3$ ,  $c = -2$
4.  $-2x^2 + 6x - 9$ ;  $a = -2$ ,  $b = 6$ ,  $c = -9$
5. -7 6. -7 7. 0 8. 17 9. 16 10. -24
11. 12; two real 12. 0; one real
13. -16; two imaginary 14. 1; two real
15. -8; two imaginary 16. 49; two real
17. 33; two real 18. -71; two imaginary
19. 1, 2 20.  $-\frac{5}{2} \pm \frac{\sqrt{17}}{2}$  21.  $\frac{3}{2} \pm \frac{\sqrt{5}}{2}$  22.  $-\frac{4}{3}, 1$
23.  $1 \pm \frac{\sqrt{6}}{2}$  24.  $1 \pm \frac{\sqrt{2}}{2}$  25.  $-\frac{2}{3}, 0$
26.  $\frac{1}{2} \pm \frac{1}{2}i$  27.  $\frac{9}{10} \pm \frac{\sqrt{21}}{10}$  28.  $\frac{3}{2} \pm \frac{\sqrt{15}}{2}i$
29.  $-1, \frac{5}{2}$  30. -1, 2 31.  $\frac{1}{2}, -1$  32.  $\pm \frac{\sqrt{3}}{2}$
33.  $1 \pm \sqrt{3}$  34. -1, 2 35. -3, -2 36. -2, 4
37. -6, -1 38.  $-2, \frac{3}{2}$  39.  $-1, \frac{1}{3}$  40. 3.2
41. 4.5 42. 3.2 sec

### Practice Level B

1. -11 2. -15 3. 49 4. 0 5. 21 6. -124
7. 4; two real 8. -12; two imaginary
9. 0; one real 10. 16; two real
11. -15; two imaginary 12. 109; two real
13.  $-2 \pm \sqrt{6}$  14.  $\frac{5}{4} \pm \frac{\sqrt{41}}{4}$  15. 0, 2
16.  $\frac{1}{4} \pm \frac{\sqrt{15}}{12}i$  17.  $\frac{1}{2}$  18.  $\frac{5}{2} \pm \frac{\sqrt{7}}{2}$
19. -0.13, 1.25 20. -0.38, 1.47 21. -4, 6

22. 1 23.  $\frac{3}{2}, 3$  24.  $-\frac{5}{2}, -\frac{1}{3}$  25.  $-\frac{1}{2}, \frac{2}{5}$

26.  $-\frac{2}{3}, \frac{3}{2}$

27. No. The area of the room is  $x(10 - x)$  and can be expressed as  $x(10 - x) = 28$  which has no real solutions. 28.  $h = -16t^2 + 64t + 80$  29. 2 sec

30. 144 ft 31. 5 sec

### Practice Level C

1. 20; two real 2. 0; one real 3. 1; two real
4. -20; two imaginary 5. 33; two real
6. -215; two imaginary 7.  $-\frac{5}{2} \pm \frac{\sqrt{33}}{2}$
8.  $\frac{3}{4} \pm \frac{\sqrt{7}}{4}i$  9.  $-10 \pm 2\sqrt{29}$  10.  $\frac{1}{2} \pm \frac{1}{2}i$
11.  $-\frac{1}{2}, 3$  12.  $6 \pm \sqrt{30}$  13.  $-\frac{1}{10} \pm \frac{\sqrt{19}}{10}i$
14.  $\frac{3}{8} \pm \frac{3\sqrt{33}}{8}$  15. 0.44, 1.36 16.  $\frac{1}{9} \pm \frac{4\sqrt{10}}{45}$
17. -0.34, 1.08 18.  $0.62 \pm 0.41i$
19.  $b = \pm 4$  20.  $b = \pm 2\sqrt{15}$  21. no solution
22.  $c < \frac{4}{3}$  23.  $c < \frac{25}{8}$  24.  $c > -\frac{1}{8}$  25. 45 mi/h
26.  $h = -16t^2 + 25t + 220$
27.  $h = -16t^2 + 220$
28.  $h = -16t^2 - 15t + 220$
29. 1st object: 4.57 sec; 2nd object: 3.71 sec; 3rd object: 3.27 sec

### Study Guide

1.  $-2 \pm \sqrt{6}$  2.  $2 \pm \frac{3}{2}\sqrt{2}$  3.  $-\frac{1}{2}$  4.  $\frac{3}{4}$
5.  $2 \pm i$  6.  $\frac{1 \pm 3i\sqrt{3}}{2}$  7. 8; 2 real solutions
8. 0; 1 real solution 9. -7; two imaginary solutions

### Interdisciplinary Application

1. 70 ft/sec 2. about 76.6 ft 3. 4.375 sec
4. 150 ft/sec 5. about 351.6 ft 6. 9.375 sec

### Challenge Practice

1.  $7x^2 - 9x - 6 = 0$  2.  $8x^2 + 3x - 11 = 0$
3. a.  $k < 0$  or  $k > 1$  b.  $k = 0$  or  $k = 1$  c.  $0 < k < 1$
4. a.  $-\frac{1}{3} < k < \frac{1}{3}$  and  $k \neq 0$
- b.  $k = -\frac{1}{3}$  or  $k = \frac{1}{3}$  or  $k = 0$
- c.  $k < -\frac{1}{3}$  or  $k > \frac{1}{3}$